1. You will work in groups of two.
2. Each group must write a technical report following the structure and guidance presented in class.
3. Reports are due March 15 prior to class.
4. Each group will present their work at the end of the term (schedule will be provided)
5. You may choose among the topics listed below.
6. Report and presentation guidance;  
   * - See the slides from Lecture 2 for how to do good presentations and reports:
   * - For the report, minimum pages: 7, maximum: 10
   * - For presentations, you have 10 minutes: Be concise; about 10 slides would be ideal.
7. Remember, plagiarism in any form will be dealt with very severely: You will almost certainly fail the course, since the course is about professionalism.
8. Always use multiple sources, including primary and secondary references. Avoid Wikipedia as a main reference.
9. Synthesize from the sources, and inject your own opinion.
10. You may narrow the topic and change the title somewhat. Just stick reasonably close to the selected topic or a subtopic of it. Depth is better than shallowness in this work.

**Topic list**

**Group 1. History**

* 1A. Development of computing from the earliest days to the 1950   
  *Hint: Discuss the key people involved, and what they invented*
* 1B. Development of electrical engineering from the earliest days to the 1920s   
  *Hint: Discuss the key people involved, and what they invented*
* 1C. Development of the field of software engineering   
  *Hint: Look at the different definitions, and how best practices have evolved*
* 1D. Edison, Westinghouse, and the AC vs. DC controversy
* 1E. How WW2 code breaking and nuclear calculations helped give rise to the computing industry
* 1F. The invention of the transistor
* 1G. The development of artificial intelligence   
  *Hint: Highlight some major advances that have been made in the field of artificial intelligence over the years.*
* 1H. The development of robotics   
  *Hint: Discuss advances over the years*
* 1I. The development of key programming languages   
  *Hint: Focus on 2-3 related programming languages and discuss how the concepts in them have evolved. Make reference to the standardization process.*
* 1J. The development of different forms of electrical lighting   
  *Hint: Discuss technological issues as each type was developed (incandescent, fluorescent, LED, etc).*
* 1K. The development of television   
  *Hint: Discuss the development of television from the earliest days, including early proposals, the introduction of colour, divergence of international standards (NTSC, PAL etc.) and the advent of digital TV.*
* 1L. History of spectrum usage   
  *Hint: Focus on an area of the spectrum if you like (e.g. 700 Mhz-5.2 Ghz). Discuss standards development, international differences, and usages the spectrum has been put to over the years.*
* 1M. Great companies in the electrical engineering that have come and gone (or merged)   
  *Hint: Discuss the history of one or more companies, and what led to their demise, or buyout or merger: What has the legacy of that company been?*
* 1N. Great computer companies that have come and gone (or merged)   
  *Hint: Discuss the history of one or more companies, and what led to their demise, or buyout or merger: What has the legacy of that company been?*
* 1O. A great career   
  *Hint: Pick an individual who has had an interesting career in your field, and write an autobiographical sketch. Use multiple sources.*
* 1P. History of a startup   
  *Hint: Pick a startup company and write about how it developed, the challenges it faced, and how it overcame them, or didn't.*
* 1Q. History of cryptography   
  *Hint: Discuss the main techniques that have been used, how they work, and how they have been broken (in very simple terms)*
* 1R. (other history-related topic of your choice)

**Group 2. Standards**

* 2A. The evolution of electrical codes   
     
  *Hint discuss how electrical codes have developed around the world and recent trends*
* 2B. Standards in Electrical Engineering and how they have evolved
* 2C. Standards in Software Engineering and how they have evolved
* 2D. Standards for the Web and how they have evolved
* 2E. Standards for software and document accessibility for the disabled
* 2F. Standards for usability and ergonomics of software and electrical Devices
* 2G. Telecommunications standards from the ITU and IEEE.
* 2H. (Other standards-related topic of hour choice).

**Group 3. Energy**

* 3A. Nuclear power: Are politicians and the environmental movement being too quick to abandon it?   
  *Hint: Discuss the benefits and risks/costs of nuclear power.*
* 3B. Issues in promoting investment in renewable energy   
  *Hint: Focus on wind, solar, hydroelectric. Issues include market distortion caused by government subsidies and feed-in-tariffs.*
* 3C. Environmental issues with renewable energy: Striking a balance   
  *Hint: Issues include land use, the need for transmission lines, environment damage from new hydroelectric dams*
* 3D. Energy storage: A huge barrier to a sustainable energy future   
  *Hint: Discuss the various forms of storage, and which have the most promise in various applications.*
* 3E. How far are we from a future powered by nuclear fusion?   
  *Hint: Summarize several articles, and compare the projections. Discuss the key problems*
* 3F. Which energy solution will win to fuel our automobiles: Batteries, ethanol or hydrogen fuel cells?   
  *Hint: Combine various sources of information from people pushing each, plus find some sources that give a balanced perspective*
* 3G. The state of the grid, and its future   
  *Hint: Discuss various problems with the electrical grid (fragility, lack of interconnection, risks from electromagnetic disturbance, infrastructure decay, etc.)*
* 3H. The smart grid   
  *Hint: Discuss ways in which the electrical grid can be made to work better, by the use of intelligent software*
* 3I. Free markets in electricity   
  *Hint: Discuss how the energy market has developed in various jurisdictions. How do the markets work, and what problems have occurred.*
* 3J. Energy efficiency   
  *Hint: Discuss some aspect of how a certain technology or service has become more energy efficient recently or how efficiency could be improved if certain policies were in effect*
* 3K. Micro-generation   
  *Hint: Discuss opportunities in today's world for small scale generation of electricity in homes or businesses (whether feeding into the grid or not). What are the issues?*
* 3L. Power use by the Internet and computers   
  *Hint: Discuss power consumption by mobile devices and/or data centres and/or the Internet as a whole, and efforts to deal with this issue.*
* 3M. (Other energy-related topic of your choice).

**Group 4. Other Electrical engineering**

* 4A. Alternative solutions to electronic waste   
  *Hint: Discuss the magnitude of the problem, and what is being done about it in various places.*
* 4B. New developments in Electrical Engineering: the Memristor   
  *Hint: Explain briefly how it works, what its applications are, and how it might result in technology change*
* 4C. New developments in Electrical Engineering: Spintronics   
  *Hint: Explain briefly what it is, what its applications are, and how it might result in technology change*
* 4D. Radiation from cell phones and Wifi: A threat to health?   
  *Hint: Discuss both sides of this controversy.*
* 4E. Impact of shortages of rare earths, helium and other resources on electrical engineering.
* 4F. Electrical safety.   
  *Hint: Discuss recent safety issues in electrical engineering*
* 4G (Other electrical-related topic of your choice)

**Group 5. Professionalism in general**

* 5A. What it means to be an engineer in different countries:   
  *Hint: Discuss how engineering is regulated differently in a selection of countries*
* 5B. Comparison of codes of ethics:   
  *Hint: Compare several codes of ethics relevant to your intende profession. What features are the same, and what features are different in them.*
* 5C. Rites of passage: A comparison   
  *Hint: Engineers have registration as a P.Eng and the iron ring, doctors have the hyppocratic oath, Computer Scientists have the I.S.P. Compare these in various ways.*
* 5D. How successful are professional societies, and how could they attract more members?   
  *Hint: Look for general discussions about professional societies; report success stories, and also stories of societies that are having various difficulties*
* 5E. To what extent should the computing profession be licensed?   
  *Hint: Discuss the pros and cons of licensing programmers and other software developers who are not engineers*
* 5F. Improving Education   
  *Hint: Discuss proposed ways to improve education in your chosen profession (e.g. computer science, electrical engineering). Focus on either K-12 (school), undergraduate, graduate or continuing education.*
* 5G. (Other general professionalism topic of your choice)
* 5H. To uphold or repeal the industrial exemption in section 12(3)(a) of the Professional Engineers Act

**Group 6. Privacy and freedom of speech**

* 6A. A case study in breach of privacy   
  *Hint: Pick a case study and discuss it in depth. What lessons can be learned?*
* 6B. Wikileaks: Evil or Good?   
  *Hint: Discuss a little of the history of Wikileaks, and present the case for and against what it has done.*
* 6C. Habits consumers should develop to help ensure their privacy
* 6D. Tor and other anonymizers: A good or bad thing?   
  *Hint: present both sides of the issue*
* 6E. . Surveillance: The pros and cons.   
  *Hint: Discuss the prevalence and types of electronic surveillance, and how it should be limited or regulated*
* 6F. Protecting children from harm in the Internet age   
  *Hint: Discuss various technologies*
* 6G (Other privacy or freedom of speech topic of your choice)

**Group 7. Legal, political and other social issues**

* 7A. Software end-user license agreements: Do they unreasonably get developers off the hook?   
  *Hint: Consider liability in the use of other products, but also consider the different nature of software*
* 7B. Are prices for roaming, Internet access, and WiFi access while travelling outrageous?   
  *Hint: Give some data about charges, discuss what might be fair. Discuss the benefits of letting the market set the rate, and what could be done to rein in prices (if anything)*
* 7C. Usage-Based Billing: A sensible or unfair approach?   
  *Hint: Discuss this concept in the context of wireless and landline, and also voice and Internet access. What would be fair for companies and consumers? Must there be regulation or are their other ways to help the market reach fairness.*
* 7D. Copyright Law: How it differs in different countries and how it is evolving
* 7E. Are software patents good or bad?   
  *Hint: Discuss both sides of the controversy surrounding software patents, and give an opinion of what you think governments and/or industry should do regarding this issue.*
* 7F. Open source software licenses   
  *Hint: Discuss differences among the various open source software licenses. What are the pros and cons of each license.*
* 7G. The creative commons   
  *Hint: Discuss the creative commons in general and the various licenses*
* 7H. Bringing technology to developing countries   
  *Hint: Discuss one or two case studies in development of technology in the 'third world'*
* 7I. Engineers without borders   
  *Hint: Discuss some of the activities of 'Engineers without borders'*
* 7J. Women in engineering and computer science   
  *Hint: Of all profesional fields, our fields have the lowest current intake of women. Discuss the situation and proposed solutions.*
* 7K. Electronic Voting: Improved democracy, or a recipe for cheating?   
  *Hint: Discuss the various e-voting technologies, the risks and the way forward.*
* 7L. Internet governance   
  *Hint: Discuss the controversy surrounding how the Internet is currently governed, including the role of the various organizations involved such as ICANN, and attempts to bring governance under UN/ITU jurisdiction.*
* 7M. Climate change and climate modelling   
  *Hint: Discuss the contribution of software to predicting climate change. Discuss the different models, what they predict and how they are evolving.*
* 7N. The pros and cons of free and open source software   
  *Hint: Discuss this from the consumer (or corporate purchaser's) perspective as well as the perspective of those producing the software.*
* 7O. Open Source Governance   
  *Hint: Discuss the role of foundations such as Eclipse, Apache and others in helping ensure quality, legal compliance etc. in open source systems. Discuss what an open source project needs to do if it wants to be adopted by one of these foundations.*
* 7P. The Electronic Frontier Foundation   
  *Hint: Discuss the role of the EFF and the causes it promotes*
* 7Q. Case study in corporate social responsibility   
  *Hint: Discuss in detail one case where a private company has donated generously or otherwise shown corporate social responsibility? How were they able to justify the costs, when faced with the reality that they key responsibility is to make profits or grow for their shareholders.*
* 7R. Social accounting   
  *Hint: Discuss how in taxation and accounting in general we should account for the cost imposed on the environment*
* 7S (Other legal or social technology-related topic of your choice)
* 7T Challenges Canadian engineers and policymakers face in helping this country become a global leader for sustainable policies.
* 7U Other issue in engineering and public policy in Ontario

**Group 8. Crime, security, failures and risks**

* 8A. Hacking: A case study   
  *Hint: Research a case of hacking that has had bad consequences; discuss the techniques used, the harm done, and ways to prevent this in the future. Make sure the case you choose has several good sources of information about it.*
* 8B. Securing your software against attackers   
  *Hint: Discuss several techniques for making software or web sites more secure. Make sure you combine several sources of information*
* 8C. Alternatives to the textual password   
  *Hint: Discuss problems related to textual passwords, and review alternatives proposed in the literature*
* 8D. Security vs. Usability   
  *Hint: Discuss how to strike a balance between security and usability. Consider different applications and their needs.*
* 8E. The London Ambulance Service failure
* 8F. The Therac-25 disaster
* 8G. The Denver Airport Fiasco
* 8H. The risks posed by robotics and artificial intelligence
* 8I. The risks posed by electromagnetic disturbance   
  *Hint: Consider space weather, pulses from nuclear explosions, gamma ray bursts*
* 8J. Securing coding   
  *Hint: Discuss key techniques to write software that is more secure, and coding errors to avoid. Avoid making this a list of short points: Focus on a few items rather than covering everything.*
* 8K. Quantum computing   
  *Hint: Explain briefly what it is, what its applications are, and how it might result in technology change, including implications for security*
* 8L. Combatting Spam, online fraud and identify theft   
  *Hint: Discuss current approaches, and possible future approaches. Discuss the impact of on society (you may focus on one subtopic)*
* 8M. Case study in large scale cyberattacks   
  *Hint: Focus on one or two documented cases. What was the impact? What lessons can we learn?*
* 8N. (other issue in crime, of your choice)
* 8O. (other case study in failure or risk, of your choice)
* 8P. (other issue in security, of your choice)

**Group 9. Project management, entrepreneurship and the Labour Market**

* 9A. Project management failures in governments and their cost to society   
  *Hint: Look for news items, auditor general reports, etc. Use a couple of examples as case studies*
* 9B. What to do and what not to do in project management   
  *Hint: Make sure you synthesize from multiple sources*
* 9C. Attributes of the most successful startups   
  *Hint: Synthesize advice on starting a company from several sources*
* 9D. The outlook for jobs in the electrical engineering industry   
  *Hint: Combine multiple sources of information, and discuss the differences among the sources and the types of jobs*
* 9E. The outlook for software jobs   
  *Hint: Combine multiple sources of information, and discuss the differences among the sources and the types of jobs.*
* 9F. Worker shortages in the software and IT industry   
  *Hint: Combine multiple reports, and discuss what could be done about it*
* 9G. What to put in your resume and what not to: A review of advice from different sources   
  *Hint: Combine multiple sources of advice on this topic*
* 9H. How to present yourself best at a job interview   
  *Hint: Combine multiple sources of advice on this topic*
* 9I. Getting ahead in your career   
  *Hint: Combine multiple sources of advice on this topic. Focus on the career type you intent to pursue (e.g. software engineer, professor, electrical engineer, etc.). What should people in this career do to help them get promoted and become better professionals.*
* 9J. Case study in getting people and corporations to switch: The transition from IPV4 to IPV6   
  *Hint: Discuss the history, how people are coping with lack of IPV4 addresses*
* 9K. Case studying in rapid change: The Mobile Phone industry   
  *Hint: Discuss the rises and falls or RIM, Nokia, Samsung, Apple, Microsoft etc. What is influencing these changes.*
* 9L. Advanced degrees and certifications: Benefits and costs   
  *Hint: Discuss the benefits and costs of doing graduate studies, an MBA or other professional certifications. What is involves, what does it cost, and how does it affect earning power, job satisfaction, etc.*
* 9M. (other issue in project management, entrepreneurship or the labour market, of your choice)